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Is the Icelandic »Nordurlandssild« identical with the Norwegian Winter Herring.

The stock of herring known as the Norwegian winter herring is also named »large herring« and »spring herring«. The herring, making the earliest approaches to the coast, from January onwards, and usually appearing at the coast from Sogn and Fjordane northward to Trøndelag, is called »large herring«. (The roe and milt of these herrings are firm.)

The greater part of the spawning herrings are however known as »spring herrings«. They are usually found off the south-western part of the Norwegian coast, the northern and southern limits generally being Bømmeløya and Egersund.

The Norwegian spring herring fishery takes place during February /March, this being the period in which the spawning occurs. The main approach of the herrings seems to be in the region of Utsira, where, as a rule, the first catches are made.

The spent herrings leave the spawning grounds and seem to follow a route northward along the coast. In some years they can be caught from Helgeland to Vesterålen in May/June, after which time they disappar into the open sea. Reports of extensive herring shoals having been observed at midsummer in the area between Jan Mayen, Spitzbergen and Bear Island may be an indicator of their whereabouts. From samples of herrings collected in these waters we know that they are Norwegian herrings. Based on this fact we have been able to form an idea of the migrations of the Norwegian herrings in the ocean, (Einar Lea, 1929).

The Icelandic »Nordurlandssild«.

The »Nordurlandssild« has derived its name from the area in which it is caught, namely the north and partly also the northeast coast of Iceland. The fishing for this herring takes place during the summer months. This tribe is a spring-spawner as the gonades are in the stages III—IV, but at present we do not know the location of its spawning grounds.

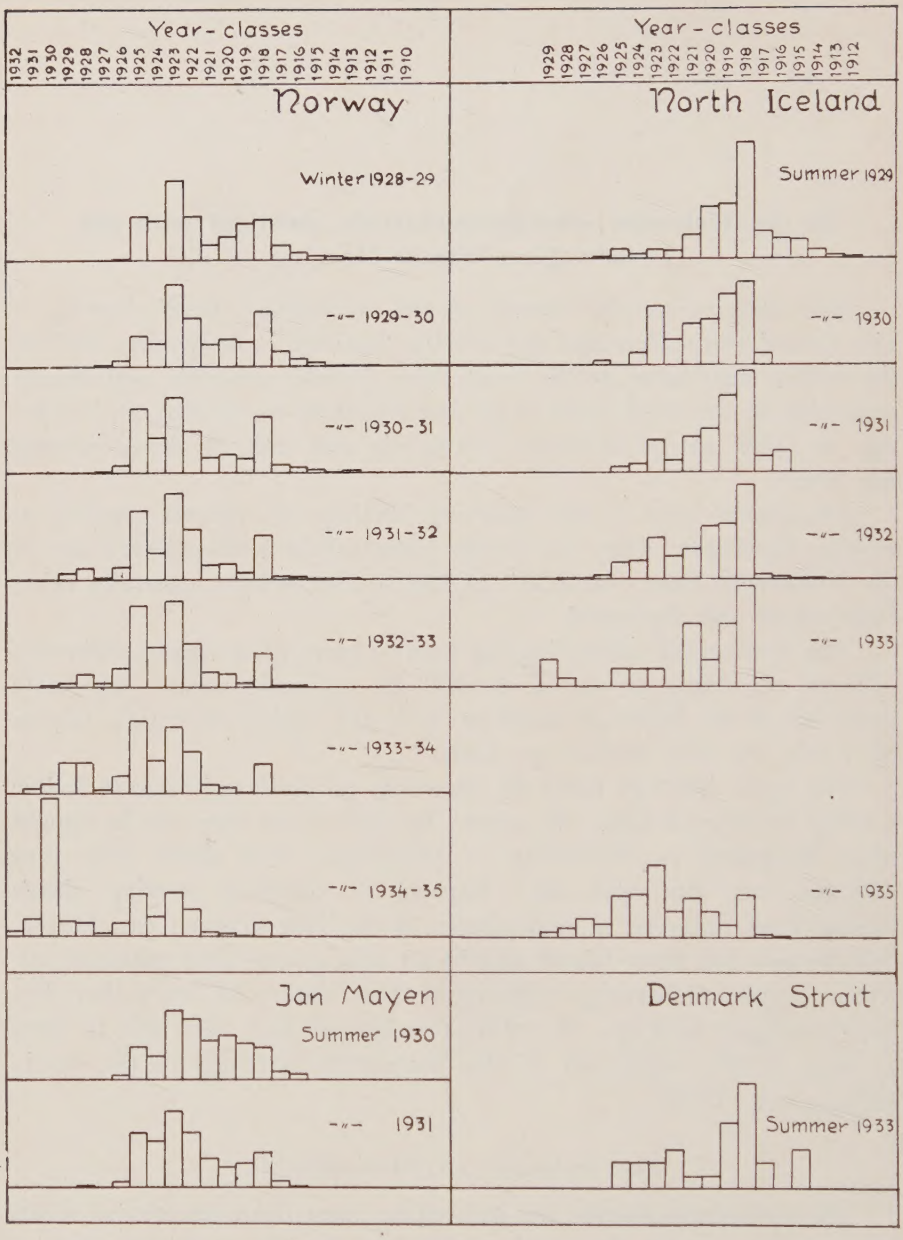

Fig. 1. Age composition of spring spawning herrings from Norway. Jan Mayen, North Iceland and Denmark Strait in the years 1929—1935. (From Runnstrøm 1936).

The Icelandic fisheries scientist Arni Fridriksson has carried out extensive investigations on the »Nordurlandssild« (1944). Based on the findings of his research, Fridriksson concludes that the majority ot the »Nordurlandssild« must be spawning in Norwegian waters, but that the herrings migrating from Norway to Iceland do not necessarily originate from the tribe of herring being found on the known spawning grounds off the west coast of Southern Norway. Probably they come from more northerly spawning areas.

The Norwegian herring investigations have as yet not had sufficient evidence to verify this theory. A solution of this problem would be of significance for the understanding of the migrations of the Norwegian herrings. We know there are herrings spawning on the banks of Træna—Lofoten, but we cannot tell to what extent, or, if spawning occurs in this area every year.

By comparing the characters of the scales of the Norwegian herrings with those of the »Nordurlandssild« they prove to have much in common both as regards the structure and the rate of growth. The two scale-characters of the Norwegian winter herrings, the »southern growth type« and »northern growth type« are also found in the »Nordurlanssild«. This will be dealt with later on. (see page 5).

The strength of the year-classes of the Norwegian herrings and the Icelandic herrings has not previously been found to be in particularly close conformity, although in some years there can be common features.

Fig. 1 represents the age composition of spring spawning herrings from Norway, Iceland, Jan Mayen and the Denmark Strait. When comparing the age composition of the samples from Norway and Iceland, a great difference between the strength of the year-classes will be noted.

In the Icelands samples the 1918 year-class is predominant from 1929 till 1933. In 1935 the year-class is 17 years old, and ebbing out. In the Norwegian samples from the corresponding years the 1918 year-class is also strong, but already in 1929 the younger year-classes are better represented. Whilst the older year-classes are dominating in the samples from Iceland, the younger year-classes are, during the corresponding years, most numerous in the age composition of the Norwegian herrings.

The two samples from Jan Mayen for the years 1930 and 1931 display a certain conformity with the Norwegian herrings from the same years as it appears that at any rate the younger year-classes have a similar composition. The sample from the Denmark Strait seems to be more like the Icelandic herrings.

In fig. 2 is given the age distribution of the »Nordurlandssild« (Arni

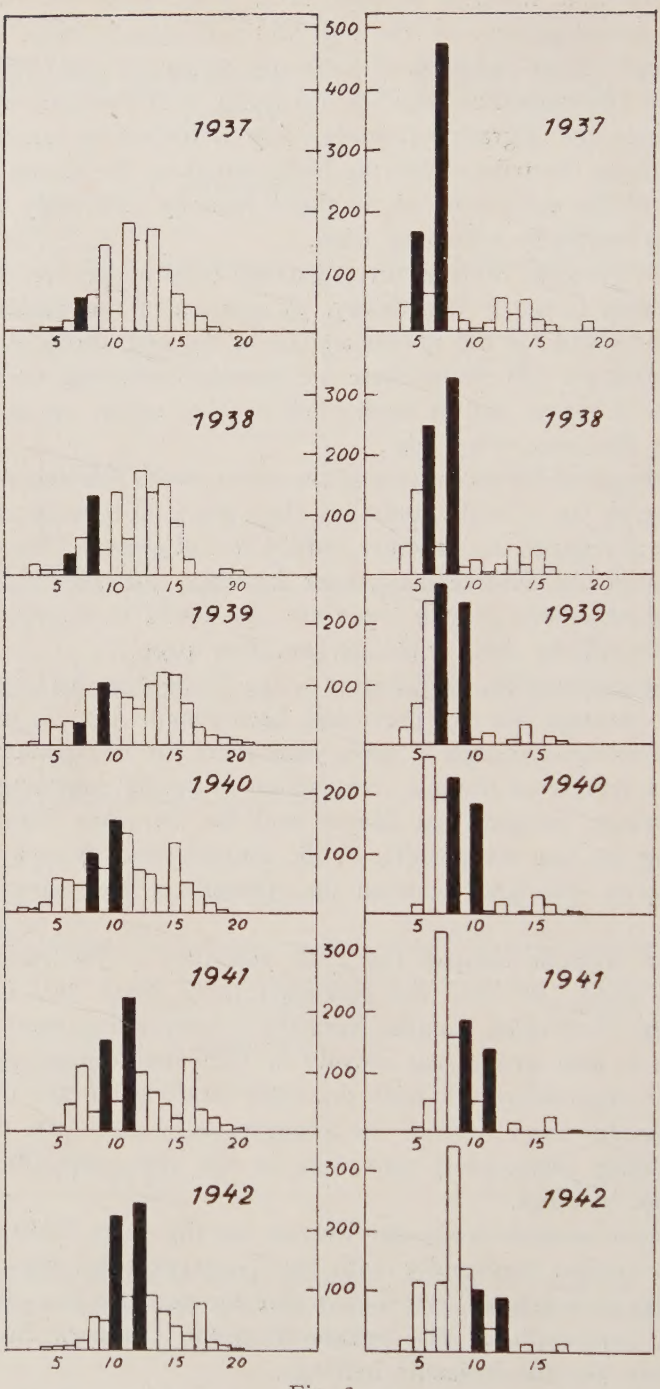

Fig. 2

Age distribution of the "Nordurlandssild" in the years 1937—1942, (From Arni Fridriksson).

Age distribution of Norwegian Spring Herring in the years 1937—1942.

Fridriksson, 1944). On the same figure is shown the age distribution of the Norwegian spring herrings from the corresponding years. When comparing the two groups year by year a considerable difference in the age distribution will be found. By following the year-classes through the different years, however, we will find certain similarities. The two closed columns on the figure represent for the year 1937 the 5 and 7 ear old herrings, these being the strongest year-classes of the Norwegian spring herrings for this particular year, whilst the corresponding year-classes of the Icelandic herrings are still small. By following on the figure the development of these year-classes of the Icelandic herrings we find them to be increasing in strength. As can be seen a year-class of the Norwegian herring reaches its maximum at the age of 6—8 years whilst a year-class of the Icelandic herring is most numerous in its 12th year.

Sven Runnstrøm (1936): »There seems, however, to be a difference in regard to the recruiting of the shoals of adult fish from those of the young herrings, viz. that the Icelandic herrings appear in the shoals of adult herrings at an older stage and therefore also decimate later than is the case with the Norwegian herrings«.

A. C. Johansen (1919, 1926) has found that the morphological characters of the Norwegian spring herrings and the spring herrings being fished off North Iceland are the same, and he is of the opinion that it would be natural to use a common name for these groups of herrings, suggesting »The Atlanto Scandian Herring«. In 1921 he found that spring-spawning herrings caught by the Faroe Islands also belong to the same group.

In his summary of our knowledge at that time on the »Atlanto Scandian Herring« (1929-1935) Runnstrøm remarks:

»Summarizing our present knowledge concerning the Atlanto Scandian herring it can be said that the Icelandic and the Norwegian spring herrings are closely related forms which cannot be separated by their body characters. But investigations of the age and growth seem to indicate that one can divide them geographically, and they inhabit different areas in the same manner as the Icelandic and the Norwegian cod. The similarity of the racial characters can be explained in the way that the physical conditions are rather uniform in the places where these herrings spawn«.

In a paper »Islandssild i norske kystfarvann« (Icelandic herrings in Norwegian Coastal waters), Th. Rasmussen 1939, mention is made of a herring which usually is found in the earliest approaches of the Norwegian large herrings. By the fishermen it is called »blodsild« (blood-herring), and of appearance it shows great resemblance to the

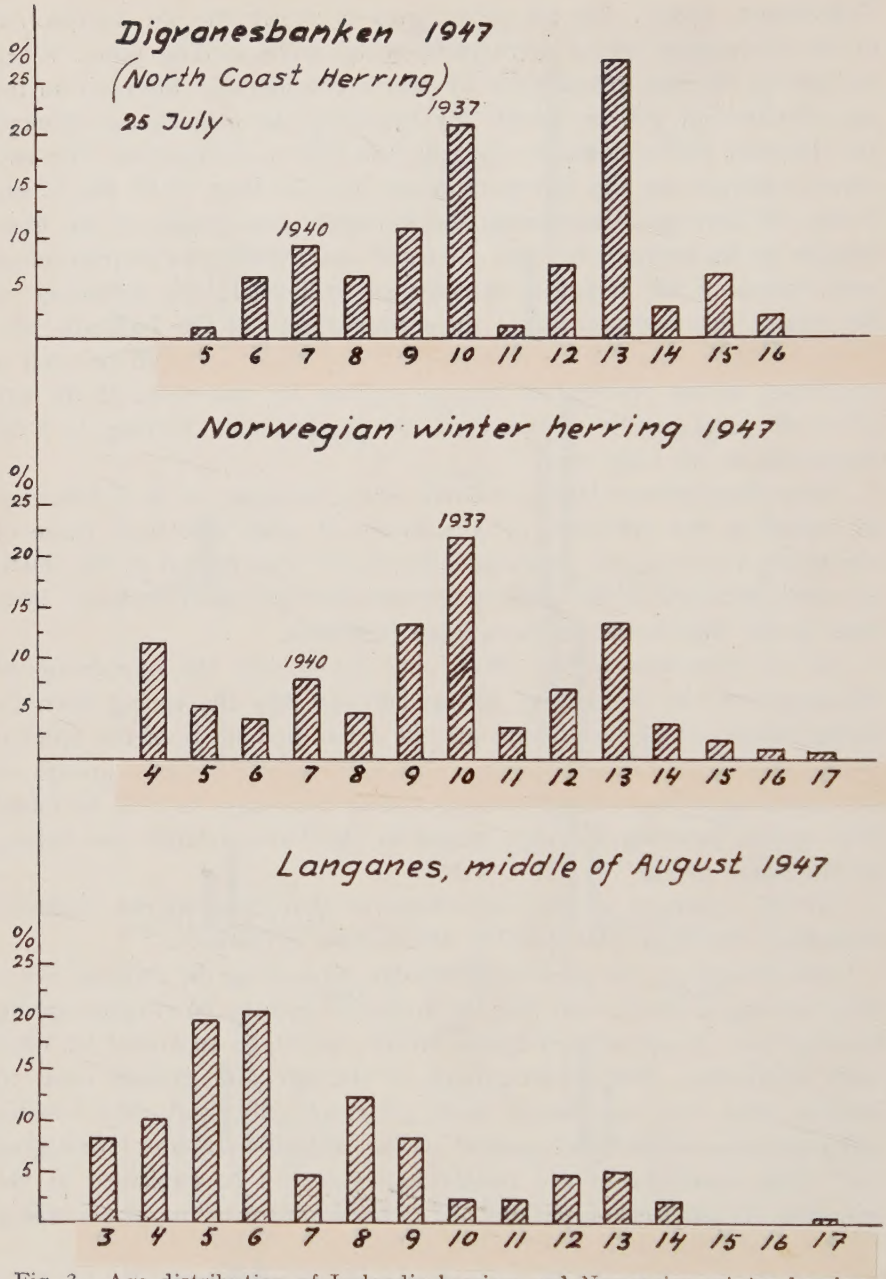

Fig. 3. Age distribution of Icelandic herring and Norwegian winter herring 1947 (Percentage).

spent Norwegian spring herring nearer stage VIII. It appears early in the season from Møre to the Sognefjord. The large herrings have, at the time of appearance of the »blodsild«, firm roe and milt in stages IV—V. The »blodsild« must be autumn-spawning or late summer-spawning herrings. The scales of these herrings show a marked likeness with those of the Icelandic herrings. The »blodsild« seem to follow the large herrings, but, as in the case of the latter, we do not know their place of origin. It is quite possible that they have their spawning places outside Træna—Vestlofoten, and there should be nothing to hinder the Icelandic herrings migrating across to the Norwegian coast.

In the summer of 1947 Fiskeridirektoratets Havforskningsinstitutt at Bergen received two samples of herrings from Iceland, each comprising 200 specimens. Both samples were taken off the northeast coast, one on the Digranesbank on July 25th, the other one by Langanes in the middle of August. The sample from the Digranesbank was prepared in fresh condition at Iceland whilst the one from Langanes was salted and sent to Bergen for preparing.

The gonades of the herrings from the Digranesbank were in the stage the Icelanders have found to be characteristic for the »nordurlandssild«.

In fig. 3 are shown the age distributions of the sample from the Digranesbank, the Norwegian winter herrings and the sample taken by Langanes. The age distribution of the sample from the Digranesbank is in good accordance with that of the Norwegian winter herrings, the main difference being that the 5 and 6 years old herrings, which together constitute 15 % of the Norwegian winter herrings, are completely absent in the sample from Iceland. The age distribution of the sample fished by Langanes on the other hand gives quite a different picture, the sample seemingly consisting of summer-spawning and partly also spring-spawning herrings, probably of the b-type (Fridriksson).

A study of the scale-characters of the herrings in the sample from the Digranesbank show them to be typically Norwegian. Out of the 200 specimens of which the sample consisted 179 had scales which were distinctive enough for an analysis. 107 of these belonged to the socalled »northern type«. The first winter-rings of the scales were clearly distinguishable. Einar Lea (1929) maintains that herrings having this type of scale are Norwegian herrings which during their first years of life have inhabited northerly waters. Of the rest 54 were of the »southern type« having more diffused winter-rings. According to Lea herrings with the latter type of scale are Norwegian herrings which have spent their first years of life in more southerly areas. 18 individuals had scales with a foreign character.

The distances between the winter-rings of the herring-scale give, as we know, a good impression of the growth of the herring in its different years of life. From the distance we can estimate the increment in growth for any particular year. The increment is termed t_1 t_2 t_3 t_4.. the index indicating the year of life. A great number of the 1937 year-class of the Norwegian winter herrings of the northern type had four sharply defined winter-rings corresponding to the first four winters of the herrings' life. The distance between the 3rd and 4th winter-rings

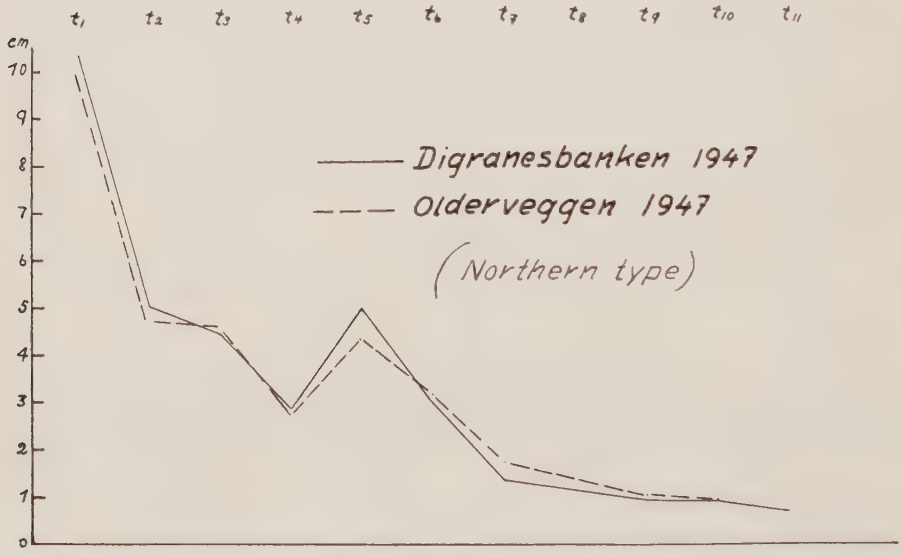

Fig. 4. Curves showing growth of the 1937 year class of herring. t_1 = growth in first year, t_2 = growth in 2 nd year etc.

of these herrings is remarkably small. A great part of the 1937 year-class of the Norwegian winter herrings is, in other words, marked by nature in a manner similar to that of the famous 1904 year-class.

In fig. 4 are given the growth of the »northern type«-herrings of the 1937 yearclass from a sample caught by Olderveggen, west Norway, and the growth of the herrings of the same type and year-class from the Digranesbank. As can be seen the agreement is very good.

In the sample from the Digranesbank the 1940 yearclass is well represented, and if we compare the rate of growth of the »southern type«-herrings of this year-class with that of the same type of the 1940 year-class in the sample from west Norway we also find a close conformity, which is shown in fig. 5.

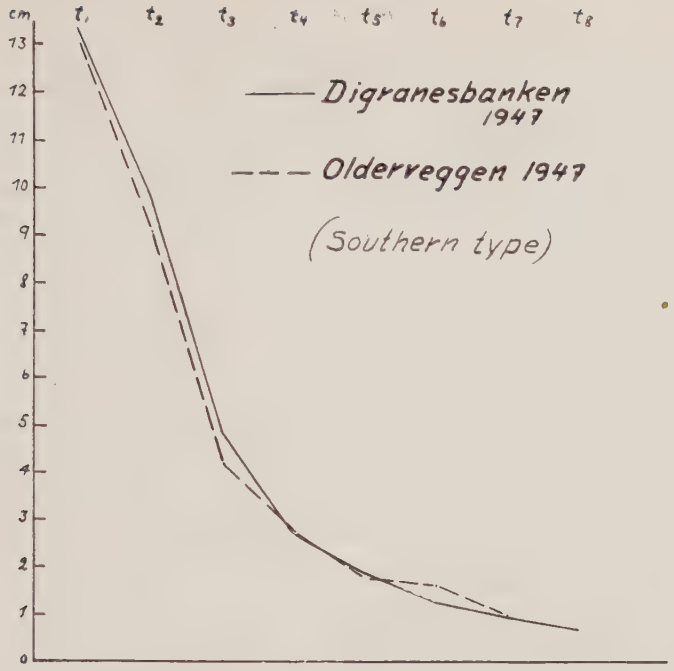

Fig. 5, Curves showing growth of the 1940 year class of herring, t_1 = growth in first year, t_2 = growth in 2nd year etc.

Conclusion.

Before 1947 we have not been aware of the similarity between the age distribution of the Icelandic herring and the age distribution of the Norwegian winter herring. The reason why this has not been discovered before is due to the fact that a year-class in the spawning shoals of the Norwegian herring attains its maximum numerical strength at an age of 6—7 years, while in the Icelandic shoals, on the other hand, it reaches the maximum when 12 years old. A sample taken in 1947 on the Digranesbank has, however, proved to be in almost complete agreement with the Norwegian herring, both as regards age distribution and rate of growth. A closer examination as to the strength of the different year-classes in the Norwegian spawning stock shows that a strong year-class entering the spawning shoals, later corresponds to a strong year-class in the Icelandic shoals, and a weak year-class in the Norwegian stock corresponds to a weak year-class in the Icelandic shoals.

The precense of the relative great amounts of older individuals and the absence of young herrings in the Icelandic stock, have to be explained.

It seems as if only the older herrings of the Norwegian spawning stock migrate to Icelandic waters. A possible explanation for the lack of young herrings in the »Nordurlandssild« may be as follows:

According to Einar Lea the herring-larvae are carried by the currents from the southwesterly spawning areas northward along the Norwegian coast, thereby being dispersed along the coast and into the fjords. Here they remain for approximately 3 years. During this period they are not in contact with the shoals of older spawners. After this coastal stage of their life they migrate into the ocean where they stay for about 1—2 years, still being isolated from the older herrings. As the herrings mature, the ripe ones separate from the unripe and start a migration to the spawning grounds off the Norwegian coast. The first spawning occurs at an age of 3—7 years, and the first-time spawners seem to approach the coast a little later than the older spawners. Now, some of them join the shoals of older spawners and start a new migration northward along the Norwegian coast. We can follow their route as far as Vesterålen where they disappear into the ocean. As the young herrings, before their first spawning, have been completely isolated from the shoals of older herrings, it is obvious that they will not be present in the »nordurlandssild« either. A great number of the first-time spawners arrives late on the spawning grounds. These do not mix completely with the older spawners. They also leave the coast later. This may possibly be the explanation why the younger mature year-classes are so sparsely represented in the »nordurlandssild«.

It may be of interest to note that a Norwegian skipper on his way to Norway in 1947 observed extensive herring shoals migrating westwards about 40 n.m. east of Langanes. A few days later rich fishing took place by Langanes, probably on the above-mentioned herring.

Based on the knowledge we so far have gathered on the »nordurlandssild« it is reasonable to say that Arni Fridriksson's theory of the »nordurlandssild« belonging to the Norwegian stock of herring is very likely, and we hope that the herring-marking experiments which have been initiated in cooperation with Iceland will bring good results and give us a better knowledge of the life of the »nordurlandssild«.

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